On the Relationship between Movement and Emotion

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Abstract: We investigated the relationship between movement and conveying emotion with moving images. Using our software system for generating moving images, we prepared eight movements from the Vertex Noise moving effect that consists of the three elements of speed, density, and strength. We assigned each element different values, then combined the movements with still images and sound data to generate moving images. Subjects looked at moving images without sound and determined whether they felt certain emotions. The results showed that higher density value affects the conveyance of emotions with moving images, and strength distinguishes the conveyance of anger from that of fear and sadness. Anger is the most recognizable emotion, and fear and sadness are difficult to distinguish using movements.
Keywords: Moving image, emotion, moving effect, movement

1. Introduction

In order to enhance the use of media augmentation to increase emotional understanding of music communication, visual information conveying the same emotion as that from the musical performance could be helpful. Thus, we studied the relationship between the physical attributes of still images of abstract shapes and the emotions they convey [1]. The relationship between the movement of moving images and the emotions conveyed is also of interest as far as using the appropriate visual information.

With our performance assistance system prototype, called Motion Picture with Music (MPM), a still image moves with the sound input and assigned moving effects, to generate a moving image. We prepared a set of movements with MPM, then generated moving images to investigate what type of moving element is effective to convey a certain emotion.

2. MPM

MPM is a software system that generates moving images.

It uses a still image as a seed, sound information as a trigger for the still image to move, and moving effects that specify how the still image will move. For creating moving images, users select a still image and moving

Table 1 Still Images

effects available in MPM, assign values to the elements of the selected moving effects, and provide sound either from recorded data or dynamic input through a microphone. The motion of moving images varies according to the moving effects' element values even when using the same moving effect, still image, and sound information.

3. Experiment

The purpose of the experiment is to investigate which element affects the conveyance of emotion with moving images. Subjects looked at moving images, and determined and scored the intensity of the emotions they felt from them.

3.1 Material

We asked 16 subjects to score emotions by looking at 8 Attneave-style nonrepresentational polygons and their spline-curved shapes, then selected a set of 9 still images that arouse as little emotion as possible to limit their effect in conveying emotion as shown in Table1.

Among the 19 types of moving effects that are prepared in MPM, we used Vertex Noise moving effect with three elements of speed, density, and strength. By giving each element 2 values (maximum and minimum), we prepared 8 movements. We call a movement Eabc, where a, b, and c show the value of speed, density, and strength, respectively. For example, if element values of speed and density are high, while that of strength is low, then the movement is denoted as E991.

Sound data to move the still images were created as beat-only of 90BPM with a sequence software system. The sound was not presented to subjects at the experiment.

We used nine still images, eight movements for each still image with the sound data, then generated a total of 72 moving images, and recorded them in MPM.

3.2 Procedure

We asked 20 subjects (12 male and 8 female, all aged between their twenties and fifties) to specify the emotions they felt by looking at the moving images. Subjects scored the intensity of each emotion they felt from each moving image between 0 and 100. Any number of emotions could be rated.

4. Results

· One-way analysis of variance (ANOVA) showed that there were no significant differences among the still images in the emotions conveyed (p-value=0.528, df=8).
· We analyzed the effectiveness of the eight movements using one-way ANOVA. There were significant differences in intensity scores among the eight movements (p-value=0 to four decimal places, df=7). A multiple comparison test showed that both E101 and E109 significantly differed from all the other movements. E901 was different from E199 and E991 and also from E101 and E109.

Table 2 The number of most conveyed emotions with moving images.

Emotion	E111	E119	E191	E199	E911	E919	E991	E999
Joy	3	9	0	0	0	2	0	0
Fear	0	0	4	0	6	1	5	0
Anger	0	0	1	9	3	6	0	9
Sadness	6	0	4	0	0	0	4	0

- Table 2 lists the most conveyed emotions for each movement on the basis of the intensity scores from the subjects. All moving images generated with E199 and E999 were mostly determined as conveying anger. Moving images generated with E191 and E991 were almost evenly determined as conveying fear or sadness.
- We performed two-way ANOVA to see the difference of conveyed emotions with each movement. All the p-values for the four emotions, the eight movements, and the interaction were 0 to four decimal places.

5. Discussion

5.1 Role of Elements
- The element of density affects the conveyance of emotions.
- The element of strength controls the kind of conveyed emotion.
- It is not easy to describe the specific role of speed in conveying emotion from moving images.

5.2 Emotion
- Joy is recognized with moving images generated with E*09, which show a floating movement, with a small density value (less notches) and large strength value (large position movement).
- Since anger obtained the largest score, it is easier to convey with moving images.
- Fear and sadness are not easy to discriminate using movement.

6. Future Works

So far, we have examined a shape's movement and its inducing emotions. In order to explain the generalized reason humans respond with certain emotions to these animated shapes, we wish to investigate other possibilities in generating moving images.

Acknowledgment

References

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